

2834

Docket No. 15162/01320



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re
U.S. Application of: HIROYUKI OKADA

For: ACTUATOR AND DRIVING APPARATUS
THEREOF

U.S. Serial No.: 09/456,184

Filed: December 07, 1999

Group Art Unit: 2834

Examiner: Thomas M. Dougherty

7# Election
3/2/01

Assistant Director
For Patents
Washington, D.C. 20231

Dear Sir:

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James W. Williams
Name of Applicant, Assignee, or Registered
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Signature

February 26, 2001
Date of Signature

W. Williams

RESPONSE

This is in response to the Office Action, dated
February 2, 2001, which set a response period of one
month ending March 2, 2001.

The Office Action sets forth a requirement under
35 U.S.C. 121 for a restriction between the following
inventions, which are defined as three groups of
claims:

I. Claims 1-6 and 17-26, drawn to a driving circuit or a method for a piezoelectric actuator, allegedly classified in class 310, subclass 317;

II. Claims 7-11, drawn to a piezoelectric actuator, allegedly classified in class 310, subclass 323.17; and

III. Claims 12-16, drawn to a discharging circuit for a piezoelectric circuit, allegedly classified in class 310, subclass 316.03.

The requirement for restriction is respectfully traversed.

The classification set forth in the Office Action for claims 7-11, i.e., class 310, subclass 323.17, is in error. That subclass is entitled:

ELECTRICAL GENERATOR OR MOTOR STRUCTURE
NON-DYNAMOELECTRIC

- . Piezoelectric elements and devices
- . . Combined with resonant structure
- . . . Direct Mechanical coupling
- Positions an object

Thus, subclass 323.17 requires that the piezoelectric element or device be combined with a resonant structure. However, the Office Action fails to identify the "resonant structure" which must be present in the claims in addition to the piezoelectric element or device before claims 7-11 can be placed in subclass 323.17.

The classification set forth in the Office Action for claims 12-16, i.e., class 310, subclass 316.03, is in error. That subclass is entitled:

ELECTRICAL GENERATOR OR MOTOR STRUCTURE

NON-DYNAMOELECTRIC

- . Piezoelectric elements and devices
- . . Electrical systems
- . . . Input circuit for simultaneous electrical and mechanical output from piezoelectric element
- Charging and Discharging.

Thus, subclass 316.03 requires that the piezoelectric element have "simultaneous electrical and mechanical output."

In contrast, each of claims 1-26 is directed to an apparatus or a method wherein a first voltage is applied to a piezoelectric device to charge the piezoelectric device and then a second voltage is applied to the piezoelectric device to discharge the piezoelectric device, thereby causing a mechanical output of the piezoelectric device which can be utilized to drive an actuator. The input to the piezoelectric device is electrical and the output of the piezoelectric device is mechanical.

Thus, with regard to the three subclasses proposed in the Office Action, each of claims 1-26 would appear to be classified in the same subclass, i.e., class 310, subclass 317, entitled:

ELECTRICAL GENERATOR OR MOTOR STRUCTURE

NON-DYNAMOELECTRIC

- . Piezoelectric elements and devices
- . . Electrical systems

. . . Input circuit for mechanical
output from piezoelectric
element.

The allegation in the Office Action that, despite the foregoing, "these claims [12-16] are a best fit for that subclass [316.03]" is in DIRECT CONTRADICTION to the EXPRESS REQUIREMENTS of that subclass. Thus, while the restriction requirement is allegedly based on differences in classification, the restriction requirement in effect states that the express requirements of the subclasses are IRREVELANT. This is reminiscent of the conditions prevalent in Alice's Adventures In Wonderland.

The basis for the allegation in the Office Action that the inventions of Group I and of Group III are related as subcombinations disclosed as useable together in a single combination is still not understood. The apparatus claims in each set of claims include a driving apparatus suitable for driving a piezoelectric device which drives an actuator. It is not readily apparent how the Office Action contemplates combining a first driving apparatus, for driving a single piezoelectric device, and a second driving apparatus, for driving a single piezoelectric device, in order to drive a single piezoelectric device. With regard to the alleged separate utilities, it is readily apparent that the actuator which can be driven by the driving apparatus of claim 1 can be a motor component or a valve discharge circuit just as readily as the actuator which can be driven by the driving apparatus of claim 12. In other words, each of the driving apparatus of claim 1 and the driving apparatus of claim 12 can be employed as a motor component or as a valve

discharge circuit. Thus, no "separate utility" has been demonstrated. Despite this allegation being challenged in the response to the first restriction requirement, the present restriction requirement still fails to set forth any logical basis for the alleged separate utilities.

The allegation in the Office Action that the combination (Group II) does not require the particulars of the subcombination (Group I) is respectfully traversed. Claim 7 (the independent claim in Group II) requires two driving units with each driving unit including the following three elements:

(a) a waveform generator for generating a signal varying corresponding to the passage of time; [lines 14-15]

(b) a first driver for generating a first voltage signal having a maximum voltage smaller than a voltage of inversion of polarization of the piezoelectric device by using the signal from the waveform generator, and for applying the first voltage signal to the piezoelectric device in the polarization direction; [lines 16-20] and

(c) a second driver for generating a second voltage signal having a maximum voltage smaller than the voltage of inversion of polarization of the piezoelectric device and the same polarity as that of the first driving signal by using the signal from the waveform generator, and for applying the second voltage signal to the piezoelectric device in a direction opposite to the polarization direction. [lines 21-27]

Thus, a comparison of element (a) of claim 7 with lines 3-4 of claim 1, a comparison of element (b) of claim 7 with lines 5-9 of claim 1, and a comparison of

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element (c) of claim 7 with lines 10-16 of claim 1 readily reveals the absurdity of the allegation in the Office Action that the claimed combination (Group II) does not require the particulars of the claimed subcombination (Group I).

As the restriction requirement is based on an improper classification, a disregard for the requirements of classification, a lack of any logical basis for the allegation of "subcombinations disclosed as useable together in a single combination", and a lack of any demonstration of separate utilities for such subcombinations, the requirement is improper and should be withdrawn.

Applicant provisionally elects the driving apparatus and method for a piezoelectric actuator of Group I. Claims 1-11 and 17-26 read on the elected invention. Claims 7-11 are included in the "read on" group because claims 7-11 require the details of the driving apparatus of claim 1.

Respectfully submitted,

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